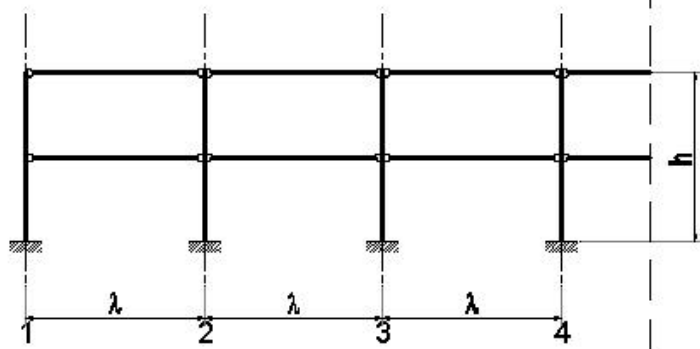


Podužni ram - sistem



POS 1 - armiranobetonska rožnjača

Armiranobetonska rožnjača raspona 6.95 m, na razmaku od 3.0 m, preseka prema skici u prilogu.
Prihvata opterećenje od krovnog pokrivača.

Geometrijske karakteristike preseka:

- površina preseka $A_b = 594 \text{ cm}^2$
- moment inercije preseka $J_b = 111730 \text{ cm}^4$

Analiza opterećenja

težina krovnog pokrivača $g_{kp} = 0.25 \text{ kN/m}^2$

težina instalacija $\Delta g = 0.35 \text{ kN/m}^2$

sneg $s = 0.75 \text{ kN/m}^2$

vetar usv: $V_{m,50,10} = 26 \text{ m/s}$

usv: $\max C_p \text{ pritiska} = 0.4$

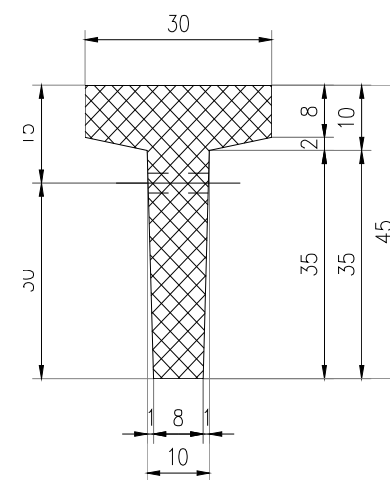
$$w = 1/2 \times 1.225 \times (26)^2 \times 10^{-3} \times 2.0 \times 0.4$$

$$w = 0.33 \text{ kN/m}^2$$

sopstvena težina rožnjače $594 \times 10^{-4} \times 25 = 1.485 \text{ kN/m}$

stalno opterećenje: $g = 1.485 + 0.60 \times 3.0 = 3.285 \text{ kN/m}^1$

povremeno opterećenje: $p = (0.75 + 0.33) \times 3.0 = 3.24 \text{ kN/m}^1$



Dimenzionisanje preseka u sredini raspona

$$M_g = 3.285 \times 6.95^2 / 8 = 19.83 \text{ kNm}$$

$$M_p = 3.24 \times 6.95^2 / 8 = 19.56 \text{ kNm}$$

$$M_u = 1.6 \times 19.83 + 1.8 \times 19.56 = 66.95 \text{ kNm}$$

$$B/b/d/h/d_p = 30/9/45/40/9 \text{ cm}$$

$$\varepsilon_b / \varepsilon_{a1} = 1.473 / 10\text{‰} ; x = 5.14 \text{ cm} < d_p = 9 \text{ cm}$$

$$= 7.134$$

$$A_a = 7.134 \times 30 \times 40 \times 2.05 / 40 = 4.39 \text{ cm}^2 \quad \Rightarrow$$

usvojeno **2RØ19** (5.67 cm²)

Dimenzionisanje oslonačkog preseka

$$R_g = 3.285 \times 6.95 / 2 = 11.4 \text{ kN} \quad ;$$

$$R_p = 3.24 \times 6.95 / 2 = 11.3 \text{ kN}$$

$$T_u = 1.6 \times 11.4 + 1.8 \times 11.3 = 38.5 \text{ kN}$$

$$B/b/d/h/d_p = 30/9/45/40/9 \text{ cm}$$

$$\tau_n = 38.5 / (0.9 \times 9 \times 40) = 0.119 \text{ kN/cm}^2 =$$

$$= 1.2 \text{ MPa} > \tau_r = 1.1 \text{ MPa}$$

$$\tau_{Ru} = 1.5 \times (1.2 - 1.1) = 0.15 \text{ MPa}$$

$$\tau_{u,u} = 2 \times 0.503 \times 24 / (9 \times 15) = 0.17 \text{ kN/cm}^2 = 1.7 \text{ MPa}$$

usvojeno **UØ8/15** (m=2)

$$b/d/h = 30/20/15 \text{ cm}$$

$$\tau_n = 38.5 / (0.9 \times 30 \times 15) = 0.095 \text{ kN/cm}^2 = 0.95 \text{ MPa} < \tau_r = 1.1 \text{ MPa}$$

usvojeno **UØ8/10** (m=2)

$$M_u = 38.5 \times 0.17 = 6.54 \text{ kNm}$$

$$A_a = 6.54 \times 10^2 / (0.9 \times 15 \times 40) = 1.21 \text{ cm}^2$$

usvojeno **2RØ10** (1.57 cm²)

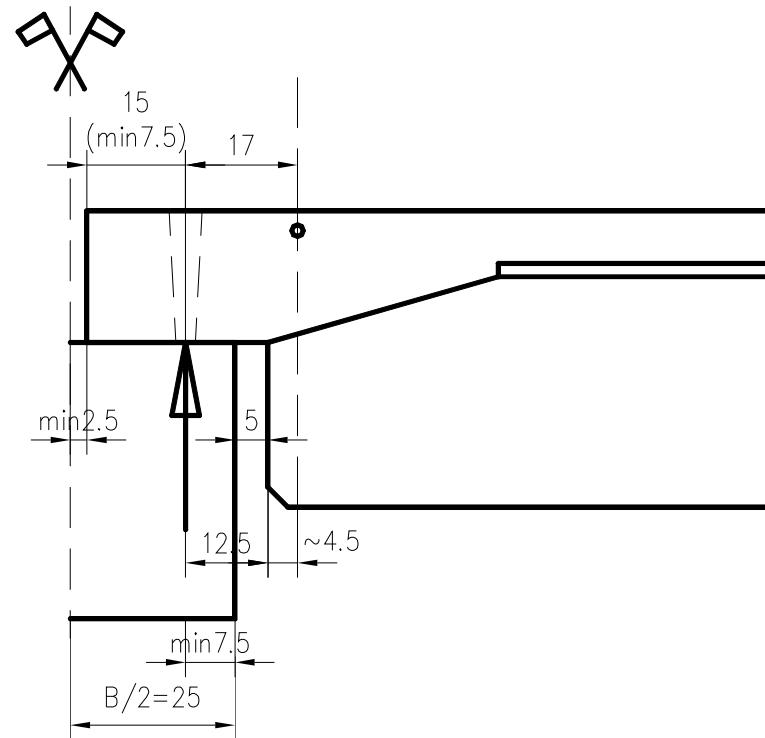
armatura za vešanje:

$$A_a = 38.5 / 24 = 0.95 \text{ cm}^2$$

usvojeno **2UØ8** (m=2) (2.01 cm²)

Za opterećenje na POS GN:

$$R_g = 3.285 \times 7.40 / 2 = 12.2 \text{ kN} \quad ; \quad R_p = 3.24 \times 7.40 / 2 = 12.0 \text{ kN}$$



Proračun prslina

$$M = 19.83 + 19.56 = 39.4 \text{ kNm}$$

$$A_{a1} = 5.68 \text{ cm}^2 \text{ (2R}\mathbf{\text{\O}}\mathbf{19)}$$

;

$$a_1 = 5 \text{ cm}$$

$$A_{a2} = 3.14 \text{ cm}^2 \text{ (4R}\mathbf{\text{\O}}\mathbf{10)}$$

;

$$a_2 = 4 \text{ cm}$$

$$\sigma_b = 7.6 \text{ MPa}$$

\Rightarrow

$$\varepsilon_b = 0.242\text{‰}$$

$$\sigma_{a1} = 187.5 \text{ MPa}$$

\Rightarrow

$$\varepsilon_{a1} = 0.893\text{‰}$$

$$\sigma_{a2} = 27.1 \text{ MPa}$$

\Rightarrow

$$\varepsilon_{a2} = 0.129\text{‰}$$

$$a_0 = 4.0 - 1.9/2 = 3.05 \text{ cm}; e_{\emptyset} = b = 9.0 \text{ cm};$$

$$\mu_{1z,ef} = 3.12\%$$

$$l_{ps} = 11.0 \text{ cm}$$

\Rightarrow

$$a_{pk} = 0.16 \text{ mm} < 0.2 \text{ mm}$$

Proračun ugiba

stalno opterećenje: $u_g = 5/384 \times g \times L^4 / E_b J_b = 2.84 \text{ mm}$
povremeno opterećenje: $u_p = 5/384 \times p \times L^4 / E_b J_b = 2.81 \text{ mm}$

trenutak $t=0$:

elastični ugib (g+p): $u = 5.65 \text{ mm}$
 $k_a^I = 0.827$; $k_a^{II} = 3.147$
 $\zeta_{a0}^G = 0.4$; $\zeta_{a0}^{G+P} = 0.673$
stalno opterećenje, $t=0$: $u_{g,0} = 4.99 \text{ mm}$
ukupno opterećenje, $t=0$: $u_{g+p,0} = 13.5 \text{ mm}$

trenutak $t \rightarrow \infty$ ($\chi \times \varphi = 2.0$):

$k_j^I = 0.632$; $k_j^{II} = 0.156$
 $\zeta_{a\infty}^G = 0.675$
stalno opterećenje, $t \rightarrow \infty$: $u_{g,\infty} = 10.37 \text{ mm}$
ukupno opterećenje, $t \rightarrow \infty$: $u_{g+p,\infty} = 18.88 \text{ mm} = L/368$

